

# VITREOUS HEMORRHAGE-ETIOPATHOGENESIS & MANAGEMENT

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## INTRODUCTION :

Vitreous hemorrhage is a very common finding faced by general ophthalmologists in the day-to-day practice. It is seen in all age groups irrespective of gender. We need to have a through knowledge about the etiology of vitreous hemorrhage, so that we can carry forward to have a proper diagnosis & management accordingly.

Here we have tried our best to produce a comprehensive guideline in the line of aetiology, investigations & management of vitreous hemorrhage, which will help our ophthalmologist friends in their day to-day practice.

## Definations of Some Vitreoretinal Bleeds.

- ❑ Suprachoroidal hemorrhage
- ❑ Subretinal hemorrhage - within RPE &

neurosensory retina

- ❑ Intraretinal hemorrhage - within layers of retina, either superficial in the NFL (flame shaped hemorrhage) or deep in the INL (dot-blot hemorrhage)
- ❑ Preretinal/subhyaloid hemorrhage - Between the ILM & posterior hyaloid face; as boat shape- fig-1
- ❑ Intragel hemorrhage - within the vitreous substance

The last two are varieties of vitreous hemorrhage which is defined as blood within the space outline by the ILM posteriorly & laterally, NPE of CB anterolaterally and the zonules & posterior capsule anteriorly.

Etiology of Vitreous Hemorrhage			
Disorders that cause retinal ischemia	Not associated with ischemia	Reputure of a normal retinal vessel	Breakthrough bleeding
Liberation of angiogenic growth factors e.g. VEGF, bFGF, IGFs etc. <ul style="list-style-type: none"> <li>● PDR-Fig2</li> <li>● Ischemic RVO</li> <li>● Familial exudative vitreo-retinopathy (FEVR)</li> <li>● Proliferative sickle cell retinopathy</li> </ul>	<ul style="list-style-type: none"> <li>● Rupture of retinal arteriole macroaneurysm from severe hypertension</li> <li>● Bleeding from an angioma</li> <li>● Congenial peripapillary arterial loop</li> </ul>	<ul style="list-style-type: none"> <li>● Traction on the vessel from PVD-either spontaneous or by blunt trauma</li> <li>● Reginal tears or retinoschisis</li> <li>● Valsalva</li> <li>● Teron's syndrome</li> <li>● Bleeding diathesis</li> </ul>	Subretinal hemorrhage breaks through the retina without an associated RD <ul style="list-style-type: none"> <li>● CNVM of neovascular AMD</li> <li>● Idiopathic polypoidal choroidal vasculopathy (PCV)</li> <li>● Choroidal melanoma</li> </ul>

Fate of Vitreous Hemorrhage		
Spontaneous clearance	Non-clearance	Unique response of vitreous to blood
<ul style="list-style-type: none"> <li>● Its is a slow but continuous process.</li> <li>● Commoner in those diseases where there is no tendency of recurrent bleeding, syneresis of vitreous gel, elderly &amp; aphakic patient</li> <li>● Less likely in PDR</li> </ul>	<ul style="list-style-type: none"> <li>● Long-standing vitreous hemorrhage, accumulated red cells, red cell debris suspended in &amp; mixed with vitreous collagen can present as 'ochre membrane'</li> <li>● Non-clearance leads to glial or fibrovascular proliferation, glaucoma, hemosiderosis bulbi, retinal damage etc.</li> </ul>	<ul style="list-style-type: none"> <li>● Rapid clot formation</li> <li>● Slow lysis of fibrin</li> <li>● Extracellular lysis of red cells</li> <li>● Persistence of intact red cells for months</li> <li>● Lack of early polymorphonuclear response</li> </ul>

### Evaluation of a Patient with Vitreous Hemorrhage

It requires complete comprehensive ophthalmological & systemic examination including detailed history, complete ocular examination & necessary investigations. Salient points are detailed below-

<b>Age</b>	<ul style="list-style-type: none"> <li>● Newborn - vitreous hemorrhage after vaginal delivery (not after CS), which clears up spontaneously.</li> <li>● Infants - ROP, shaken baby syndrome</li> <li>● Young boy - X-linked retinoschisis</li> <li>● Children - trauma, retinoblastoma, leukemia &amp; other bleeding diathesis</li> <li>● Young adult - Eales disease</li> <li>● Middle age - PDR (MC), RVO, PVD, melanoma, IPCV</li> <li>● Elderly - neovascular AMD</li> <li>● Any age - retinal tear</li> </ul>
<b>Chief complaints</b>	<ul style="list-style-type: none"> <li>● H/O trauma or spontaneous ?</li> <li>● Sudden painless DOV or sudden appearance of floaters</li> <li>● If preceded by flashes of light, then PVD, RD or retinal break should be considered</li> <li>● H/O diabetes, hypertension, drug intake, cerebral stroke are very important</li> </ul>
<b>VA</b>	<ul style="list-style-type: none"> <li>● Level of vision at presentation is an accurate predictor of long term prognosis.</li> </ul>
<b>SL for anterior segment</b>	<ul style="list-style-type: none"> <li>● Signs of trauma - globe rupture ?</li> <li>● Iris &amp; angle neovascularisation</li> </ul>
<b>Pupil</b>	<ul style="list-style-type: none"> <li>● RAPD in RD, RVO, large macular lesion or optic nerve disease</li> </ul>
<b>IOP</b>	<ul style="list-style-type: none"> <li>● &lt;9 or &gt;22 mm Hg are to be explained</li> <li>● Causes of hypotony - RD, wound leak, open globe injury</li> <li>● Causes of RIOP - neovascular glaucoma, haemolytic glaucoma.</li> </ul>

<b>Fundoscopy, if hemorrhage is less dense</b>	<ul style="list-style-type: none"> <li>● Identify the type of vitreous hemorrhage</li> <li>● If PVD is suspected sclera depression is mandatory to exclude peripheral retinal break.</li> <li>● An acute PVD without hemorrhage has - 2-4% chance of having retinal tear but that having hemorrhage has 70% chance of having a tear.</li> <li>● Condition in the fellow eye can help in diagnosis - PDR, peripheral retinal breaks/RD, retinal vasculitis, ocular ischemic syndrome, venous occlusion, FEVR, retinoschisis etc.</li> </ul>
<b>Ultrasound B scan with corresponding A scan, if direct view is not possible</b>	<ul style="list-style-type: none"> <li>● Detect any detachment or mass lesion</li> <li>● Differentiate between fresh &amp; clotted hemorrhage-unclothed hemorrhage with no cellular clumps may not be visible ultrasonically.</li> <li>● Determine whether the posterior cortical vitreous is completely or incompletely detached, especially when surgery is planned.</li> <li>● Differentiate PDV from RD-PVD shows good after movement with low to-medium intensity spikes in A scan but RD shows high intensity spikes in A scan.</li> <li>● Rule out involvement of macula - which is important prognostically.</li> </ul>
<b>Other investigations</b>	<ul style="list-style-type: none"> <li>● TC, DC, Hb, ESR, PBS</li> <li>● FBS</li> <li>● CXR, ECG</li> <li>● Carotid Doppler, Echocardiography</li> <li>● FFA/ICG, one media is clear</li> <li>● USG/UBM, if media is hazy</li> </ul>

Management : It is individually tailored and involves 4 options.

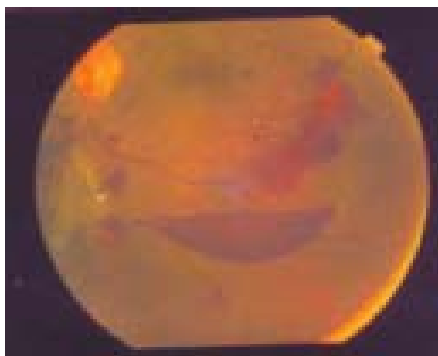
<b>observation</b>	<ul style="list-style-type: none"> <li>● In vitreous hemorrhage of unknown etiology &amp; attached retina on ultrasound, the patient is asked to rest with head end elevated &amp; reevaluate after 3-7 days.</li> <li>● Oral vit C can be given for faster clearance, though clinically not proven</li> <li>● In patients with known etiology &amp; attached retina, reevaluation can be done after 3-4 week</li> <li>● In eyes with attached macula, one can wait for 2-3 weeks for PDV to occur, as this enhance the technical ease &amp; outcome of surgery</li> </ul>
<b>Photocoagulation</b>	<ul style="list-style-type: none"> <li>● Indicated for proliferative retinopathies once the retina is visible.</li> <li>● Once can visualize &amp; treat retinal break or avulsed vessel by barrage laser.</li> <li>● Trans-conductival diopexy mode can be used for PRP in cases of media opacity or poorly dilating pupil.</li> </ul>
<b>ARC (anterior retinal cryotherapy)</b>	<ul style="list-style-type: none"> <li>● Breaks down blood-retinal barrier, which leads to clearance of liquefied blood.</li> <li>● More inflammatory than laser, forms pre-retinal fibrin &amp; causes tractional RD</li> <li>● Best indication is post - vitrectomy eyes with fresh vitreous hemorrhage from sclerotomy sites or from early anterior hyaloids proliferation.</li> <li>● Should not be done in eyes not having previous laser, in eyes having tractional membrane, hemorrhage of unknown etiology.</li> </ul>

<p><b>PPV (pars plans vitrectomy)</b></p>	<ul style="list-style-type: none"> <li>● Eye with macula- off RD with vitreous hemorrhage should have immediate surgery.</li> <li>● Eyes with attached ratina, good PVD, non-resolving vitreous hemorrhave over 2-3 months are the best indication</li> <li>● Eyes with advanced proliferative retinopathy where the hemorrhage does not resolve in 6-8 weeks after adequate laser therapy are benefitted from early vitrectomy</li> <li>● Indicated in cases of RD, giant retinal tears, open globe injury, AMD, IPCV</li> <li>● In general early vitrectomy is indicated where the underlying pathology is likely to progress fast if left untreated.</li> <li>● Surgery can be deferred in well-layered proliferative retinopathy &amp; attached retina.</li> <li>● Cal also be deferred till good PVD occurs, in cases of Terson’s syndrome, closed globe injury, post caaract surgery vitreous hemorrhage or bleeding diathesis.</li> </ul>
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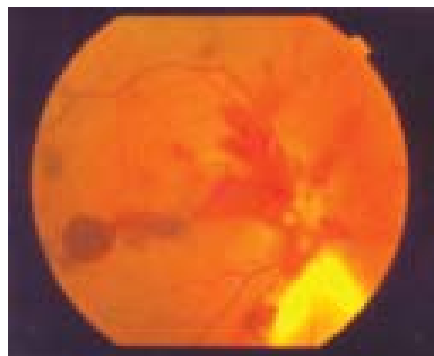
Conclusion : Vision is not what you see, rather imaging what you don’t see. When you known all the possible etiologies, you can come closer to the diagnosis of the underlying cause of vitreous hemorrhage. Observation & some investigations will help you to pinpoint the diagnosses. At the end, retina service is there to address the aetiology itself either by laser photocoagulation or by vitreoretinal surgery.

**Abbreviation :**

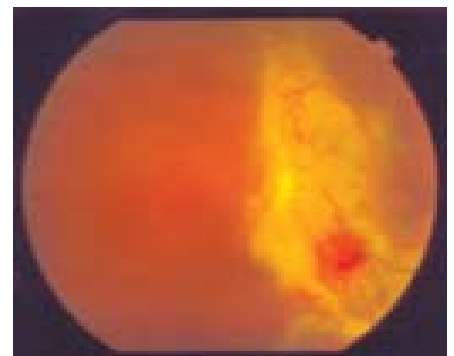
1. PDR - proliferative diabetic retinopathy
2. RVO- retinal vein occlusion
3. PVD - posterior vitreous detachment
4. CNVM - choroidal neovascular memembrance
5. AMD - age - related macular degeneration



**Fig-1** - Preretinal / sub-hyaloid hemorrhage between ILM & posterior hyaloid face, typically boat-shaped.



**Fig-2** - Intragel hemorrhage of Blood Dyscrasia



**Fig-3** - High risk PDR vitreous hemorrhage with fibrovascular proliferation.

